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ABSTRACT

Traditionally, education has been compartmentalized into academic subjects removed from everyday life, and education has been built on blocks going from the concrete to the abstract. However, humans often do not learn in that linear mode, and if they are to be prepared for the work world of the 1990s and beyond, they need a different model. Academic and vocational education must be integrated. Eight models for integrating vocational and academic education can be identified: (1) incorporating academic competencies into vocational courses; (2) combining academic and vocational teachers to incorporate academic competencies into vocational courses; (3) making the academic curriculum more vocationally relevant; (4) modifying the alignment of both academic and vocational education and curricula; (5) the Academy model; (6) replacing conventional departments with occupational clusters; (7) single-occupation high schools; and (8) electing career paths or occupational majors. The impact of any of these models will require changes in how colleges are now organized, and additional resources to develop materials and staff will be required. The integration of academic and vocational education, however, should not be viewed as the end in itself, but rather as a tool to be used to help increase the quality of education. The Developing a Curriculum (DACUM) process has been used by Waukesha County Technical College (Wisconsin) to develop programs and integrate academic and vocational education. (KC)

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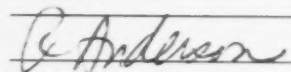
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STRATEGIES TO FACILITATE CHANGE IN HIGHER EDUCATION

The prevailing model of education beyond about the third or fourth grade is to compartmentalize academic subjects and slowly remove them from the context of everyday life. This is done under the premise that each discipline becomes increasingly more difficult for both teacher and learner as the student advances from grade to grade and into high school and college.

Most teachers were taught, both academic and occupational, to use the logical hierarchy concept in developing curriculum and lesson plans--go from simple to complex--the complex task having as pre-requisites all the simpler tasks below it.

In a new College Board book entitled Thinking Through Mathematics: Fostering Inquiry and Communications in Mathematics Classrooms (1990), by Silver, Kilpatrick and Schlesinger describe the logical hierarchy concept as akin to building a brick wall. The student is to build the wall a brick at a time from the bottom up--from simple to complex--and when they are done they can step back and see what a wonderful wall they have built. "Unfortunately, this metaphor for ongoing instruction has two flaws; it ignores how people learn, and it distorts what they are learning"--according to the authors.

Occupational subject teachers have historically been taught to analyze the activity and build the instructional process from simple to complex. Occupational educators have had a distinct advantage over general educators--they could use a project, to build or design, as their tool for relevance of the curriculum. This process differential between general educators and occupational educators has been the basis for the various attempts to call general education--education and occupational education--training.

When one observes successful teaching it becomes readily apparent that both general educators and occupational educators educate and train if we accept this simple definition of education and training from dictionary of education:

Education *The process of growth and change in the student enabling the individual to better meet and deal with the varied aspects of the student's development and activities.*

Training The special kind of teaching and instruction in which the goals are clearly determined, are usually readily demonstrated, and call for a degree of mastery which requires student practice and teacher guidance and appraisal of the student's improved performance capabilities.

The academic model of excellence; (i.e, the goal of academic endeavor to learn more and more about less and less) may still be acceptable for research scientists, but it is an unacceptable goal for the vast majority of people.

The ever increasing rate of technical and social change requires that all people have a base of knowledge of communication skills, sociology, psychology, economics, mathematics, and science as it applies to technology, computer literacy, and the change process.

To be an expert in sociology, but unable to apply the theory and concepts of sociology in relevant terms and context for the student, leaves the teacher to be of value only to him/herself.

In Education and Learning to Think, by L. Resnick, (1987), we are reminded that many decades of research on human learning of complex subjects suggests that "people do not always learn things bit by bit from the ground up. They often jump into any situation with some knowledge, however rudimentary or inaccurate, and, even before they have mastered specific techniques, they begin fitting their knowledge into a larger picture."

He further states: "Forcing them to master all the so called pre-requisites in a hierarchy before moving on dooms many of them to trivialize repetitious instruction and keeps them from seeing where they are headed." They never really get a chance to "stand back and look at the wall"; all they can see are a "few bricks" and they begin to blur rapidly.

Most occupational educators will agree with that criticism if it is applied to general educators. Most occupational educators will argue profusely that the logical hierarchy based on activity analysis is the most effective manner to ensure that curriculum is designed to assist the student to learn and demonstrate proficiency.

The problem with this argument is that now, and increasingly in the future, the very premise from which occupational educators accuse general educators with wasting the time of students by forcing them to solely learn fact and process, out of context with reality and quickly forgotten, will befall upon occupational educators. Rapid technological and societal change is literally forcing all educators to remember and to work earnestly at their primary task to assist students to learn the process of learning.

The complexities of life and ever-growing base of knowledge that is required for a person to be successful as a person and as a worker is truly changing the purpose of education.

Many people still harbor the tradition that places more value on learning for learning's sake than on learning for purpose. Learning for learning's sake was the activity of the "gentleman" who didn't have to work for a living. Learning for a purpose was for those who intended to work. This philosophical difference has carried over to today as we view the college preparation high school track as socially superior to the occupational track.

In addition to the technological reasons for integrating general and occupational education, we also have a societal reason. In a democratic society every citizen should have the opportunity to become successful. The perception of success is heavily weighted upon the kind of work one does for a living. Therefore, a person should be able to climb the career ladder and the academic ladder as their motivation and abilities allow.

As we continue to research and explore the purpose and process of education and training, an ancient Chinese proverb gains renewed importance:

*Tell me, I forget
Show me, I remember
Involve me, I understand*

Understanding cannot be deep unless the student is involved in learning how to learn.

While educators world wide have been involved with research and writings for many decades, most of the research has merely verified what common sense and observation has shown us. It is the student who learns and it is the teacher who facilitates learning.

But, what does that have to do with teaching a person to become an electronics technician or an auto service technician or a computer programmer? That question brings us to the second ancient proverb:

*There is no point in doing well
that which you should not be doing at all.*

The rapid expansion of knowledge that impacts itself in technology and process, coupled with the acceptance of the premise of the new management philosophies makes it increasingly difficult to accept the old traditional educational model that separates general education (designed to educate the person) and occupational education (designed to train the worker).

The changes in society that require a person to assume responsibility for their own success and the changes in the workplace that require a person to share responsibility for success with their employer have almost identical educational requirements. The student, whether studying to become a better person or studying to become a skilled worker, now is required to become far more competent in a whole series of process and knowledge areas that educators have assumed or hoped would be developed by osmosis or by some other indirect means. Critical and creative thinking, problem solving, decision making, interpersonal relations and communications and many other essential skills are not directly taught or are taught in the traditional compartmentalized fashion practiced by most educators.

If we are to develop education and training programs that will prepare a person for the specifics of employment today and also have the knowledge, skill and attitude to be able to adopt and adapt to rapid social and technological change, then we need a process to determine what those skills, knowledge, and attitudes are. A process that has been adopted by Waukesha County Technical College (WCTC) to determine what should be taught is DACUM. (See Appendix A.)

DACUM DESCRIPTION

1. An analysis of an occupation performed by expert workers in the occupation
2. A skill profile of an occupation used as a curriculum plan and an evaluation instrument
3. An abbreviation for Developing A Curriculum.

As little as ten years ago, we could use the occupational analysis to develop a new occupational program and use the traditional compartmentalized curriculum model and to provide the student with an excellent set of skills and knowledge that culminated with employable skills. We hoped that the graduate would recognize the need to stay current with technological change. We provided the graduate with information about new courses a few times a year as we mailed program announcements to every address in our service area. We thought we were doing the "right things well."

We continued to encourage our general education faculty to use occupation based applications to assist students to see the relevance of the subject to their future work.

Some faculty have developed very direct application of theory, but others have refused for a variety of reasons. However, lack of conviction and resources on the part of the college management is the major reason that educational change is slow to happen.

As we moved into the middle 80s another problem became more prevalent--time. There was not enough time to be able to incorporate all the technological changes as well as student development into the time available.

It became even more apparent that if we were to ensure that students had time to reinforce skills and concepts and to add additional skills and concepts to our occupational programs, we would have to increase both the efficiency and effectiveness of the learning process. We would have to find ways to wean the student from reliance upon the teacher to enable the student to learn how to learn. We would have to find multiple ways to reinforce learning experiences to cause students to internalize the desired competencies. We would have to find ways to cause the student to recognize that the skill, knowledge and attitude of a successful person are essentially the same as for a successful worker.

In a March, 1990 draft paper from the National Center for Research in Vocational Education, University of California, Berkeley, the author identified the following eight models for integrating vocational and academic education:

- "1. Incorporating academic competencies into vocational courses: Some schools have worked to incorporate more academic material into existing vocational courses, either through exhortation, through the adoption of new curriculum materials, or through the development of model curricula.
2. Combining academic and vocational teachers to incorporate academic competencies into vocational courses: A somewhat different approach has assigned academic teachers the responsibility of increasing the academic components of vocational programs. Academic teachers can then teach individual lessons or modules for vocational students, help vocational instructors to develop their own academic exercises, or pull students out of vocational classes to work on academic competencies. The crucial element in this approach (in contrast to the first model) is that academic and vocational teachers collaborate in modifying vocational programs.
3. Making the academic curriculum more vocationally relevant: A third approach modifies the academic curriculum instead of vocational courses, by incorporating vocational applications and examples and reconfiguring academic courses so that the topics are more relevant to vocational students. While informal methods of encouraging these changes have

been tried, a more common approach has been to introduce specific courses: the "applies academics" courses including Principles of Technology, Applied Mathematics, and Applied Communications, as well as several others less commonly adopted. The ways in which these courses have been use vary widely, however. In some cases they are clearly related to vocational purposes in a sequence of courses, while in other schools they have been treated as forms of remedial education or as electives unconnected to vocational education.

4. Modifying both academic and vocational education and curricula "alignment": Another model combines elements from the preceding approaches, by using more occupationally-relevant material in academic courses and more academic education in vocational courses and then linking the two. This may happen when two or more teachers, from both the academic and the vocational sides, coordinate the content of what they teach at a particular time--what we term "horizontal alignment." In the best cases, this practice creates sequences of academic and vocational courses that reinforce each other--or "vertical alignment"--clarifying that integrating academic and vocational education is an activity that can consider entire programs rather than individual courses.

5. The Academy model: Academies are schools-within-schools that typically include academic teachers in English, math, and science with a vocational instructor in a subject--like health, electronics, business, or agriculture--which gives focus to the Academy. Because these teachers stay with a group of students for all four courses, over two or three years, the possibilities for both horizontal alignment and vertical alignment are increased enormously. Academies also establish close relationships with particular firms operating in this occupational area, providing students with additional motivation, mentors, and internships.

6. Replacing conventional departments with occupational clusters: A few high schools have established departments organized around occupational clusters in place of conventional academic and vocational departments. Like the focus of each Academy on a particular occupational area, this facilitates cooperation among teaches and both horizontal and vertical alignment, and provides academic teachers with obvious vocational emphases to incorporate into their classes.

7. Single-occupation high schools: In a few cities single-occupation high schools exist. Like an academy of a single occupational-cluster department, these schools provide an obvious focus for efforts to integrate academic and vocational education and a culture in which the occupational content of coursework cannot be ignored.

8. Electing career paths or occupational majors: A final approach is to maintain conventional academic and vocational departments, but in addition to have students and teachers organized in "career paths" or occupational clusters. This creates a matrix structure in which teachers participate in both department discussions about the content of particular academic and vocational courses, and in career path groupings which can then develop coherent sequences of courses and coordinate particular courses in the career path. In addition, the career paths force students to think harder about their occupational futures, supported by counselors, and they combine students from different backgrounds with very different occupational ambitions, reducing the usual segregation of college-bound and vocational students."

The impact of any of these models will require changes in how colleges are now organized, and additional resources to develop materials and for staff development are required. Again, the most vital ingredient for success is vision, commitment and support by management at the local and state level. Changes in teacher training are mandatory, because occupational and academic teachers are now prepared in ways which reinforce the separation of academic and vocational education.

The integration of academic and vocational education however should not be viewed as the end in itself. The integration of academic and vocational education should be viewed as a tool to be used to help increase the quality of education.

Charles Benson, in his presentation to the United States Senate Subcommittee on Education, Arts and Humanities (1989) concerning "Integrating Academic and Vocational Education" reminds us that:

"As I commented earlier, integration can take a number of different forms. Some of these forms may be highly effective with some students, but these same types of integration may not be useful for students with other characteristics. One cannot necessarily expect 'one size will fit all.' It would be extremely useful to be able to assess accurately the results of using different kinds of curricula with different types of students. But we need more than findings from standardized test instruments now available. It is also important to know for any given group of students how the results of integrated instruction differ from results obtained under conventional instruction. Does integrated

instruction increase the ability to solve workplace problems? Is the learning acquired under integrated instruction more readily transferable into the workplace than those learnings gotten in a present day classroom? Does integrated instruction promote cooperative attitudes and does it inculcate a sense of responsibility? At this time, there are no widely-accepted tests to assess these important attributes."

Are we trying to do the "right things right?" Pat Hutchings, in the closing address to the Fifth American Association for Higher Education Conference on Assessment made the following comments that are appropriate for this paper:

"Finally, it's a method that recognizes that the coherence of the curriculum has to reside not only in our neat schemes but in the student's ability to make connections and create coherence, an ability that can be attended to, focused on as an expectation, taught for, assessed, and improved."

Lastly, another ancient proverb that has a direct relationship to the teaching learning process:

"It is unthinkable to expect a person to listen to your advice and ignore your example."

If we are going to improve the quality of education through the integration of vocational and academic education, then it becomes imperative that vocational and academic teachers work together.

The Southern Regional Education Board has a 14-state membership that is researching ways to improve schools through the linkage of vocational and academic education. Bottoms and Presson in the Consortium Report state:

"For the new approach to succeed, academic and vocational educators must be equal shareholders. This assertion is made for three reasons. First, the barrier between academic and vocational education is an artificial one, attributable to an educational tradition that places more value on learning for learning's sake than on learning for a purpose. As a thoughtful individual once observed, 'If society respects a philosopher, but not the plumber, then neither the philosophy nor the pipes will hold water.' Similarly, if we respect the purely academic side of education but not the applied side, the schools will not be educating all of their students. Both academic and vocational educators need to heighten their recognition of the complementary nature of their work."

The second reason for involving both academic and vocational teachers in curriculum integration efforts is based on the ways in which teachers are currently prepared and certified for their profession. All secondary school teachers are specialists—an electronics teacher no less so than a biology teacher. The teacher should know one content field particularly well, along with the pedagogical strategies that work best in transferring that knowledge to students. Thus, mathematics is best taught by trained mathematics teachers and carpentry by experienced journeymen. By working together, teachers will see where their areas of expertise intersect and can help each other. The mathematics teacher can assure that problems to be solved reflect practical, applied situations; conversely, the carpentry teacher can emphasize the many ways that computation of mathematical principles come into play in that trade. Students (and particularly reluctant students) reap the benefits by realizing that indeed there is a point to academic knowledge. We cannot expect students to see the relationship between academic disciplines and problems in a vocational context unless their teachers do.

Third, successful implementation of a program of vocational and academic study will place new demands on teachers' time. The most promising approaches are those in which the vocational and academic teachers work together to develop new or adapt available curricula, plan courses, and prepare materials for instruction. These activities take time not currently available during the school year. Bringing these two groups of teachers together to develop and implement better alignment of the academic and vocational curriculum whether they are in the same high school or in an area vocational center and several feeder high schools, will require that schools reduce course loads, provide summer planning activities, and allow for planning and organizational periods free from the press of daily teaching."

WCTC's Rationale and Model

Over the past 25 years WCTC faculty have applied many forms of integration of academic and vocational education and processes designed to cause students to learn how to learn. Our current attempts are briefly described as follows or developed by WCTC Instructional Development Specialist Jan Lathrop:

"WHY IS INTEGRATION APPROPRIATE?"

Changes in our economy appear to have resulted in increased demands for skills, and an increased number of job changes within the workforce. Higher level workers are working and managing in more uncertain and interactive environments. They need new skills as their jobs change and as they change jobs. The narrow skills training that was the pattern of vocational education of the past, is no longer sufficient for the worker of today and the future. A new generation of technicians having broad,

interdisciplinary training is needed. Vocational and technical students have historically learned specific skills for rather narrow occupations. The workers of the 1990s will have to know how to apply and transfer skills to new settings. Educational programs preparing technicians should provide a relatively unchanging broad interdisciplinary base. It is the application of broad concepts and principles that changes. The goal is to enable our students to be able to apply the broad concepts and principles of communication, social and behavioral sciences, mathematics and science in new situations.

WHAT IS INTEGRATION OF GENERAL AND OCCUPATIONAL EDUCATION?

General education and related technical courses, which include communication skills, behavioral and social sciences, mathematics, and science provide the broad base for our students. Students are introduced to the principles and concepts that form the foundation for their particular technical specialty. The broad concepts and principles are then reinforced and applied as students learn more specific skills in the occupational courses. The foundation concepts and principles and the applications are blended into a functioning or unified whole curriculum. General and occupational education become a seamless curriculum.

WHAT IS WCTC'S MODEL FOR INTEGRATION?

An occupational analysis is completed to identify the skills needed by workers in the occupation targeted by the educational program. The DACUM (Develop A CURriculum) method is used to directly involve expert workers of the community. After identifying the appropriate knowledge, skills and attitudes needed, a coherent sequence of courses is developed with appropriate amounts of general education and occupational skills. General education administrators and faculty consult with occupational administrators and faculty to select appropriate competencies for their occupation. General education and occupational faculty collaborate to select appropriate learning experiences and assessment strategies which will provide the student with occupational skills that can be used now, and transferred to new jobs and skill development. The integration model also includes 23 Critical Life Skills (See appendix B.) that employers and educators say our students need to be successful in their occupational and personal lives. The development and assessment of these skills across the curriculum will assure students that they have the needed skills and the ability to transfer those skills to new or unfamiliar situations.

WHERE DO WE GO FROM HERE?

- o Encourage general education faculty and occupational faculty to examine the curriculum plan together in order to maximize the sequence to support occupational courses.
- o Encourage and support the faculty as they serve as consultants to each other, strengthening both the foundation concepts and the technologies.
- o Build consistently on the foundation of interdisciplinary skills.
- o Implement a systematic curriculum development process to strengthen the process of our model.
- o Show students the interrelatedness of the foundation concepts and principles and their technologies so that they can apply what they have learned in new or different situation.
- o Strengthen the relationships between our general education and applied curriculum.
- o Continue to implement the Critical Life Skills across the curriculum.
- o Assess student outcomes and communicate student achievement among occupational and general education faculty within and between programs.
- o Communicate student outcomes and achievement to students and to employers.
- o Continue to cause students to learn how to learn."

The integration of academic and vocational education is an old concept, the principles are rooted in the apprenticeship model as practiced in centuries past. The elitists' attempt to make education the realm of the few and training the path of the many could exist for many years because work skills allowed it to occur and worldwide educational models developed by the elite fostered and promoted the division.

The necessity for all persons to be both educated and trained in order to meet the challenges of the 21st Century is an idea whose time has come.

To many educators, worldwide, it is becoming increasingly clear that there is a critical need for glasnost and perestroika in education.

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DACUM INFORMATION SHEET

WHAT IS DACUM (DEVELOPING A CURRICULUM)?

DACUM is a relatively new and innovative approach to occupational analysis. It has proven to be a very effective method of quickly determining, at relatively low cost, the competencies or tasks that must be performed by persons employed in a given job or occupational area.

The profile chart that results from the DACUM analysis is a detailed and graphic portrayal of the skills or competencies involved in the occupation being studied. The DACUM analysis can be used as a basis for (1) curriculum development, (2) student learning, (3) training needs assessments, (4) worker performance evaluations; and (5) competency test development.

DACUM has been successfully used to analyze occupations at the professional, technical, skilled, and semiskilled levels. DACUM operates on the following three premises: (1) expert workers are better able to describe/define their job than anyone else, (2) any job can be effectively and sufficiently described in terms of the tasks that successful workers in that occupation perform, and (3) all tasks have direct implications for the knowledge and attitudes that workers must have in order to perform the tasks correctly.

A carefully chosen group of about 10-12 experts from the occupational area form the DACUM committee. Committee members are recruited directly from business, industry, or the professions. The committee works under the guidance of a facilitator for two days to develop the DACUM chart. Modified small-group brainstorming techniques are used to obtain the collective expertise and consensus of the committee.

The DACUM committee is carefully guided through each of the following steps by the coordinator:

1. Orientation
2. Review of job or occupational area description
3. Identification of general areas of job responsibility
4. Identification of specific tasks performed in each of the general areas of responsibility
5. Review and refinement of task statements
6. Sequencing of task statements
7. Identification of entry-level tasks
8. Other options, as desired

Because of their current occupational expertise, committee participants do not need to make any advance preparations. Participants on past DACUM committees have, without exception, found the activity to be a professionally stimulating and rewarding experience.

CRITICAL LIFE SKILLS

FOR OCCUPATIONAL AND PERSONAL SUCCESS

1. **CAREER EXPLORATION:** The student will be able to identify, analyze, and evaluate abilities, values, interests, and goals as they relate to career exploration and change.
2. **CAREER SELECTION:** The student will be able to make appropriate career choices.
3. **CAREER SECURING:** The student will be able to demonstrate job search and interview skills.
4. **COMMUNICATION SKILLS:** The student will be able to demonstrate a knowledge of the basic mechanics (e.g., spelling, punctuation, grammar) of standard written English.
5. **COMMUNICATION SKILLS:** The student will be able to use written communication appropriate to the situation in order to express ideas, needs, and concerns clearly, concisely and accurately.
6. **COMMUNICATION SKILLS:** The student will be able to communicate in an interpersonal or public setting.
7. **READING:** The student will be able to read critically and analytically.
8. **INFORMATION SEEKING:** The student will be able to identify and fulfill information needs.
9. **LEARNING STRATEGIES:** The student will be able to use effective study skills.
10. **MATHEMATICS:** The student will be able to demonstrate numerical and logical reasoning and apply mathematical concepts in a variety of real life settings.
11. **CONFLICT RESOLUTION:** The student will be able to apply effective techniques to resolve interpersonal conflict.
12. **PROBLEM SOLVING:** The student will be able to demonstrate effective problem solving skills.
13. **FAMILY AND SOCIAL RELATIONS:** The student will be able to apply effective communication techniques in order to develop positive relationships with family members, co-workers, friends and others.

CRITICAL LIFE SKILLS, Page 2 of 2

14. **TIME MANAGEMENT:** The student will be able to organize activities to accomplish desired tasks in the time available, using effective time management techniques.
15. **ETHICS IN THE WORKPLACE:** The student will be able to identify generally accepted ethical standards in the workplace.
16. **TEAMWORK:** The student will be able to work effectively and cooperatively in a group setting.
17. **CULTURAL AWARENESS:** The student will be able to interact positively with people from different cultural, economic and social backgrounds.
18. **STRESS MANAGEMENT:** The student will know how to manage stress in appropriate ways.
19. **GROOMING, ETIQUETTE, HYGIENE:** The student will be able to apply acceptable standards of grooming, etiquette, and hygiene to promote personal and professional success.
20. **CRITICAL THINKING:** The student will be able to apply the techniques of critical thinking, effective decision-making skills, and analytical skills.
21. **SELF-CONCEPT:** The student will be able to evaluate his/her self-concept in regard to self-esteem, values/attitudes, interests, goals, and strengths/weaknesses.
22. **COPING WITH CHANGE:** The student will be able to understand the nature of change. The student will have the skills to recognize, cope with, and adapt to change.
23. **SCIENCE AND TECHNOLOGY:** The student will be able to demonstrate an understanding of the impact of science and technology on our changing world.